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ACTIVITIES OF THE TECHNICAL COUNCIL

Standardization of Portable Electric Power Plants

The acute shortage of electric power necessary for the mechanization of labor-consuming and heavy work is felt in areas removed from power systems, such as construction areas, quarries, peat and timber developments, and agricultural regions.

The condition is no better during the organizational-preparatory period at construction projects which depend on public power systems or communal electric power plants for electric power. During construction of high-voltage lines and step-down transformers at substations, many operations are carried out by hand due to lack of electric power.

For example, half of the railroad stations at which loading and unloading operations are carried on do not have electric power. In the majority of cases, loading and unloading at these stations is done by hand methods.

Portable electric power plants would be of inestimable value in the mechanization of these operations. But the output of such electric power plants (up to 150 kilowatts) is lagging because the manufacturing base for their production is inadequate.

At present, ministries and organizations produce portable and semi-portable electric power plants which differ in the primary motive power and voltage of their generators. There are up to 24 size-types (tiporazmer) of such electric power plants.

In order to facilitate production of complex portable and mobile electric power plants, it is first necessary to standardize them and to decrease the number of size-types.

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For this purpose the Standardization Section of the Technical Council called a conference of representatives of the following Ministries: Electrical Industry, Agriculture, Timber Industry, Internal Affairs (GUShOSDOR, Main Administration of Highways), Heavy Machine-Building, Construction of Fuel Enterprises, Construction of Heavy Industry Enterprises, Construction of Military and Naval Enterprises, Transportation, and Armed Forces.

The conference deemed it possible to decrease the number of size-types of portable electric power plants and determined the types that would satisfy all principal users.

The following types of primary engines, those now in existence and those being developed, are to be used as a basis: Diesel engines, which can be converted to gas, steam engines with a high rpm and high steam pressure, and also generators already being produced.

One type of mobile electric power plant, the ZhES-2, has been adopted. It has a three-phase generator with a capacity of 1.6 kw, voltage of 133/230 volts, and current frequency of 50 cycles per second. It uses a 3-hp gasoline engine, Type L-3/2.

Several size-types of portable electric power plants on runners have been adopted. They include the following types of three-phase generators:

1. Capacity, 5 kw; voltage, 133/230 volts; current frequency, 50 cycles per second; engine, two-cylinder Diesel, 10 hp, 1,500 rpm.

2. Capacity, 10 kw; voltage, 230/400 volts; current frequency, 50 cycles per second; engine, four-cylinder Diesel, 20 hp, 1,500 rpm.

3. Capacity, 20 kw; voltage, 230/400 volts; current frequency, 50 cycles per second; engine, steam, 38 hp, 1,000 rpm, or KD-35 Diesel, 37 hp, 1,000 rpm, convertible to gas.

4. Capacity, 20 kw; voltage 230/400 volts; current frequency, 175-200 cycles per second; engine, KD-37 Diesel, 37 hp, 1,000 rpm, convertible to gas.

5. Capacity, 30 kw; voltage, 230/400 volts; current frequency, 50 cycles per second; engine, YaAZ-200 Diesel, 60 hp, 1,500 rpm.

6. Capacity, 50 kw; voltage, 230/400 volts; current frequency, 50 cycles per second; engine, D-4, four-cylinder Diesel, 100 hp, 1,500 rpm.

7. Capacity, 100 kw; voltage 230/400 volts; current frequency, 50 cycles per second; engine, D-6, six-cylinder Diesel, 150 hp, 1,500 rpm.

8. Capacity, 50 kw; voltage, 230/400 volts; current frequency, 50 cycles per second; engine, light-duty steam, 250 hp, 1,000 rpm.

Thus, the above nine size-types of electric power plants were selected. These did not include portable railroad electric power plants with capacities above 150 kilowatts (power trains), since the need for them is not great.

In the list special attention was directed to the portable electric power plant for lumbering. This has a capacity of 20 kw, normal voltage of 230/400 volts, but an increased current frequency of 175-200 cycles per second. We have not as yet produced this type of electric power plant, but it is being seriously considered. Electric saws with current frequency

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of 50 cycles per second weigh 17-20 kg. Increased current frequency permits the use of lighter electric saws weighing 7-10 kg. The change to lighter saws cuts down the labor force in the felling and cross-cutting of trees by 25 percent.

Various types of cable junction boxes and switches which interfere with the operation of the electric power plants and sometimes lead to defective connection and damage of the cables were also exposed at the meeting. To correct this, a standardization of junction boxes and switches will have to be introduced.

Appraisal of the Design of a General Purpose Single-Bucket Loader

The Soviet of Ministers of the USSR directed the Ministry of Heavy Machine-Building to prepare two experimental models of a general purpose, single-bucket loader for the C-80 tractor during the second quarter of this year. These loaders, which are designed to mechanize loading and unloading operations, will go into serial production after testing.

The Bureau for Appraisal of New Machines and Mechanisms of the Technical Council appraised the design of the general-purpose loader which had been developed by the All-Union Scientific-Experimental Institute of Lifting and Transport Machine-Building (VNIIPTMASh) of the Ministry of Heavy Industry. The loader has the following characteristics: capacity of bucket, 1.5-6 cu m, depending upon the weight of one cu m of dry, granular material (0.65-2.5 tons/cu m); load-lifting capacity, 4 tons; width of bucket, 2.78 meters; total length at lowest horizontal position of bucket, 7.3 meters; total height of loader at lowest position of bucket, 4.25 meters; total height when bucket is in lifting position, 6.8 meters; maximum height of unloading, 4.3 meters; weight of loader without tractor, 7.5 tons; weight of loader with tractor, 19 tons; specific pressure on ground, 0.98 kg/sq m.

The appraisal showed that the design is not yet ready for serial production. The principal deficiencies observed were as follows: non-constructive execution of several parts of the reverse assembly, such as the slit clutch, roller, Part No 4; frictional clutch, bevel gear, Part No 15; clutch shift, and others. There is no basic complication in the arrangement of parts, but their durability is doubtful. In the selection of materials, final processing is not indicated. Similar observations were also made in relation to the following units: the brake of the worm-screw reducing gear, the driving cylinder, and the tightening roller.

Relative to the method of construction, it is recommended that some parts be manufactured by casting. To assure more dependable and durable parts, the substitution of more durable types of steel for the current types is recommended.

Most observations made in the Technical Council's appraisal have already been adopted by the VNIIPTMASh in production of experimental models. Those observations pertaining to serial production of the loader will be studied during development of the working plans for serial production.

Excavator E-3

On 29 April 1947, an all-inclusive meeting of the Open-Cut Mining Section of the Technical Council was held with representatives of the Ministries of the Coal Industry of the Eastern and Western Regions of the

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Ministry of Nonferrous Metallurgy, of Internal Affairs, of Transportation, of Building Materials, and of Heavy Machine-Building. The meeting was called to consider the design of a new caterpillar electric excavator for open-cut mining, the E-3, with a bucket capacity of 3.0 cu m.

The excavator was designed by the Ural Machine Plant imeni S. Ordzhonikidze, which considered the latest improvements in the technique of excavator building. The new model is considerably more modern in design than the old Model E-IV-2, and in a number of characteristics surpasses the best foreign excavators of this class, such as the Bucyrus 120W and the Marion 4161.

The principal innovations are: wide utilization of roller bearings; slot couplings which provide for the transmission of great torsional moments and easy assembling and dismantling of units; enclosure of the main transmission in lubricating baths; hardening of parts by high frequency currents; and use of a separate motor for operating caterpillar tracks, which simplifies design considerably and increases the dependability of the excavator in operation. The high-power lifting motor (250 hp at 100 percent utilization) allows the generation of a lifting force of 40 tons and a cutting force of bucket teeth of 13 tons, compared with 36 and 11 tons, respectively, in the American excavator, Bucyrus 120W.

The meeting heard the conclusions of the experts Professor I. I. Abramovich, Engineer A. S. Rebrov, and Engineer N. D. Averin, and the appraisal by the head of the Open-Cut Mining Section, Professor N. G. Dombrovskiy, Doctor of Technical Sciences. The meeting approved the design as a whole but recommended a separate motor for the operation of the caterpillar tracks.

To ensure continuous operation of the excavators and to increase further their resistance to wear and the durability of their parts, the meeting recognized it as necessary that:

1. The Ministry of the Electrical Industry produce and supply the electric equipment and spare parts which meet the heavy work requirements; in particular, supply the electric motors with air filters; and provide for the installation of dry transformers and for the substitution of VM-16 oil switches for VM-6 oil switches.

2. The manufacturing plant provide the excavators with high-grade spare parts equal to 5 percent of the excavator's weight; the production of spare parts must be included in the plant's program.

3. The manufacturing plant supply instructions for operation and repair of the excavators.

The requests of individual ministries for the increase of the bucket capacity for excavation of light soils and for the decrease of ground pressure by as much as 1.5 to 1.6 kg/sq m will be studied by the Ural Machine Plant during the process of perfecting and standardizing.

The experimental model of the new Soviet excavator will be produced in the second quarter of this year and will undergo tests at plants and under working conditions.

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